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THE IMPENDING RESEARCH EXPLOSION AND EDUCATIONAL PRACTICE.

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THE RAPID EXPANSION OF EDUCATIONAL RESEARCH HAS BEEN ACCOMPANIED BY THE FEELING THAT A CONNECTIVE LINK MUST BE ESTABLISHED BETWEEN THE AREAS OF RESEARCH AND EDUCATIONAL PRACTICE. THE INCREASED AVAILABILITY OF RESEARCH FUNDS NECESSITATES REFORMULATION AND CONCEPTUALIZATION OF SUITABLE MECHANISMS AND AGENCIES CAPABLE OF BRIDGING THE GAP BETWEEN EDUCATIONAL RESEARCHER AND PRACTITIONER. TO FILL THIS NEED, A TAXONOMY IS FORMULATED FOR A CHANGE CONTINUUM FROM RESEARCH TO ACTION. RESEARCH, THE FIRST ACTIVITY, ADVANCES KNOWLEDGE BY A CRITERION OF VALIDITY. THE SECOND ACTIVITY, DEVELOPMENT, FORMULATES A SOLUTION TO AN ACTION PROBLEM AND RENDERS THE FORMULATED SOLUTION INTO AN ACCEPTABLE, ADAPTABLE FORM. DIFFUSION INFORMS THE PRACTITIONER OF THE PROCESS OF DEVELOPMENT THROUGH THE SUBACTIVITIES OF DISSEMINATION AND DEMONSTRATION. ADOPTION, THE FINAL STAGE, INCORPORATES AN INNOVATION INTO A FUNCTIONING SCHOOL SYSTEM. ADOPTION IS REALIZED THROUGH THE PROCESSES OF INSTALLATION (ADAPTING THE INNOVATION TO AN ADOPTING SCHOOL) AND INSTITUTIONALIZATION (REGULARIZING THE INNOVATION). IN ADDITION TO THE CONNECTIVE TAXONOMY, THE FACULTY OF THE OHIO STATE UNIVERSITY COLLEGE OF EDUCATION HAS ESTABLISHED SPECIFIC AGENCIES (DIVISION OF EDUCATIONAL DEVELOPMENT, EVALUATION CENTER, PROJECT DISCOVERY) TO COPE WITH PROBLEMS OF THE RESEARCH-ACTION CONTINUUM. THIS PAPER WAS PRESENTED AT THE SUMMER LECTURE SERIES (KENT STATE UNIVERSITY, JULY 19, 1965). (GB)

# THE IMPENDING RESEARCH EXPLOSION AND EDUCATIONAL PRACTICE[1]

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Although educational research as a field began before the turn of the Century, perhaps with the studies of Joseph L. Rice, it has been only during the past decade that educational research has come into its own. With the passage of the Cooperative Research Act in 1954, coupled with various provisions of the National Defense Education Act of 1958, educational research became big business. As funds became available, more and more persons in the field of education were drawn into the pursuit of research. Many agencies dedicated to educational research, such as educational research bureaus housed in Universities, have emerged: thus, from two-thirds to three-fourths of the educational research bureaus now in existence have gotten underway since 1960. A demand has arisen for research personnel, particularly research administrators, from public school systems and from state departments of education. All around us, then, we see exciting signs of a prodigious expansion in research activity in the field of education.

This fantastic expansion of the research enterprise has been accompanied by a growing feeling that somehow, research ought to be translated into improved educational practice. That such translation has in fact not occurred is just as obvious as is the fact that the research

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enterprise has greatly enlarged. Over the past decade, particularly under the impetus of criticism that has engulfed the public schools since Russia's first Sputnik, we have become increasingly aware of the great gap between research and theory, on the one hand, and educational practice on the other. The findings of Paul Mort concerning the 50 year educational lag have taken on more and more relevance. The study of educational innovation in New York State, undertaken by Henry M. Brickell, has further illustrated the enlarging chasm between what we know how to do and what we actually do. Our growing sense of frustration over our obvious incompetence to deal with this problem has resulted, as one might predict from psychological theory, a widespread hostile, aggressive reaction between scholars and practitioners. So the practitioners insist that blame for the failure to close the theory-practice gap may be placed squarely at the feet of the ivoried-tower, cloud-nining, impractical, dreaming, "mere" theoreticians; while the scholars, on the other hand, defend themselves by pointing to the failure of the short-sighted, fly-by-the-seat-of-the-pants, pencil-pushing practitioners to keep up with the findings of research and to translate them into practical applications.

This appalling situation is likely to grow much worse before it gets any better. That the theory-practice gulf will be enlarged even further than it already exists is almost assured by the passage of the Elementary and Secondary Education Act of 1965. This federal legislation, long overdue, and certainly very much needed, will nevertheless have the short term effect of greatly accentuating the deplorable lack of communication between theoreticians and practitioners. Great gains have been made over the past decade because of the availability of funds from sources that I

mentioned earlier, but we are now confronted with the necessity of spending wisely in one year more money than has been available for similar purposes during the entire preceding eventful decade. It strikes me that we have neither the man-power, the institutional resources, nor the vision to rise to this challenge very adequately unless we are ready to take a long hard look at ourselves and at the concepts which have guided our activity heretofore. It is in regard to this latter problem of conceptual reformulation that I wish to address my remarks today.

It seems to me that the hostility which is being expressed by practitioners toward researchers, and by researchers toward practitioners is not without some basis on both sides. Practitioners have in fact been heavily oriented to day-to-day problems. They have worked overly hard to protect their vested interests. They have defended the status quo and have often bitterly attacked those who proposed changes. They have offered up the stereotype of the autonomous classroom teacher as an excuse to keep new ideas and new practices from penetrating into the classroom. But of course, researchers have been equally guilty. They have assiduously avoided addressing themselves to problems of import to the practitioner. They have insisted upon studying only those problems which were amenable to study by their cherished laboratory methods. They have produced a literature full of conflicts and contradictions, so that anyone intending to improve his practice by applying what is to be learned from the literature was necessarily frustrated and immobilized.

Despite the fact that these charges can be made and substantiated on both sides, it seems to me that the real crux of the problem, the real explanation for our failure to close the theory-practice gap, does not

lie in these factors but instead can be explained in our failure to construct suitable mechanisms and agencies which bridge the gap between the researcher and the practitioner. This contention can perhaps best be exemplified by reference to another area of activity in which, it seems to me, the problem has been more adequately faced. I refer to the area of agriculture and the Agricultural Extension Service. It would not occur to us to ask a farmer, even one with a Bachelor of Science degree in agriculture, to subscribe to professional journals in agronomy, in the hope that by reading them he might uncover applications which would assist him in doing a better job of farming. Nor would we ask the agronomist to leave his laboratory regularly in order to work directly with farmers in helping them to improve their farming practices. We realize at once in this example that practicing farmers and research agronomists have very little to say to one another and that to require them to engage in some kind of dialogue would be a dreadful waste of time for both of them. Instead, we devise a suitable means of communication between these two groups. The Agricultural Extension Service provides laboratories in which agronomists and other basic researchers in the field of agriculture may carry out the experiments which their scientific interests indicate ought to be pursued. The agronomists, far from talking directly to a farmer, talk instead to a University-based extension specialist who is himself a professor. The extension specialist talks to county agents, who in turn deal primarily with a selected group of farmers in their counties who may be thought of as the innovators or cosmopolites in the county. These innovators in turn act as demonstration agents for the remainder of the farmers in the district. Only at this stage does the

large mass of farmers come into contact with the ideas that were originally developed in the agronomists' laboratory. Moreover, should the farmer decide that he wishes to adopt the innovation for his own use, he need only call the Soil Conservation Service to have available to him a large coterie of technical helpers who will assist him in adapting the innovation to the circumstances and conditions of his own farm.

It is obvious that we need some kind of similar agency in education if we are to have any hope of closing the theory-practice gap. Now I am not necessarily proposing an educational extension service which is parallel in every regard to the Agricultural Extension Service. There are after all a good many rather fundamental differences between the agricultural enterprise and the educational enterprise. In agriculture, we are dealing with a private entrepreneur, the individual farmer, who can make his own decisions regarding the practice which he will follow. In education, we are speaking instead of a vastly complicated bureaucracy, whose every decision must be entered into and concurred with by a wide variety of administrative, fiscal, technical, and supporting personnel. The product of the farm is easy to see and to assess; there is no real difficulty in determining whether the farmer's yield of corn this year is more or less substantial than it was last. The effects of innovations can be directly observed. In education, the nature of the product is much more ambiguous; we are of course interested in producing an educated child, but what constitutes an educated child, and how one can measure whether a given child measures up to any standard of education which we might propose, is a vastly complicated problem. The motive of the farmer is clearly economic; the motive of the school is social. All of these differences are

suggestive of the fact that whatever mechanism we may develop in education, it is likely to be rather different than that mechanism which we have found to be so successful in agriculture. Nevertheless, there can be no doubt that some kind of mechanism is needed, and we obviously need to start now to conceptualize and to build such mechanisms.

## A PROPOSED CONCEPTUAL FRAMEWORK

I would like to spend most of my time this morning in discussing with you a series of conceptual definitions which, I believe, can provide a beginning point. Perhaps it is most convenient to return for a moment to the Education Act. This Act, as I see it, is intended to improve schools by fostering innovative thinking and getting that thinking into usable, practical forms. Obviously a great many activities are possible under the terms of the Act. These activities vary in their nature, i.e., in the objectives they are designed to accomplish. Each of these activities rests on a separate conceptual base. Each activity has different objectives, has different criteria which are suitable to determining whether the objectives are met in any instance, and must be assessed or evaluated by methods which are peculiarly appropriate to its own objectives and criteria.

It will be very helpful to have available a taxonomy of such activities, together with their objectives and criteria to guide our thinking as we consider how the theory-practice gap might be closed. I should like to propose for this purpose a taxonomy which is illustrated in the diagram now being projected. This taxonomy is organized to depict a continuum of change from research into action.

My first activity is, of course, research. I will stipulate that the objective of research is to advance or extend knowledge. It does not matter to a researcher whether that new knowledge now has or ever will have a practical application; indeed, to require such applicability is to foist onto research a criterion which is entirely inappropriate to it. For if the object of research is to advance knowledge, then the only suitable criterion is validity. All I have the right to ask a researcher is the extent to which his findings are unequivocal and unconfounded (i.e., internal validity), and to what population they may be generalized (i.e., external validity). Moreover, I cannot expect the researcher to influence change in any programmatic way; the relation of research to change is that it <u>may</u> provide a basis for innovation if anyone else chooses to capitalize on the research and is clever enough to develop an application from it. But this is an "iffy" question; it is fortuitous if an application is made. It is clearly not an expectation that we can legitimately hold for researchers that they themselves provide such applications. I'm not suggesting, of course, that researchers <u>should not</u> provide applications if they are of mind to do so; I am saying that it is not too legitimate to <u>expect</u> them to do so. The essential activities of research are inquiry and experimentation, and nothing else.

Obviously then, I will need someone who will undertake the development of applications. I will refer to this as the <u>development</u> activity, as shown in the second major column of the diagram. Development in turn may be considered in terms of two sub-activities: invention and design. I will stipulate that the objective of invention is to formulate a solution to an action problem. This formulation can be based either on

research, experience, or even mere intuition; and while we may argue that inventions based upon research are more likely to be successful in the long run, it is clearly unnecessary to require that they be so based. Indeed, in view of the low state of the research art at this moment, it would be foolhardy to suppose that most practical problems can be solved through recourse to already completed research.

What are the criteria by which an invention may be judged? It seems to me that there are two: feasibility and viability. The question of feasibility has to do with whether the proposed solution to the problem can be made to work at all; while the question of viability has to do with whether the proposed solution can be expected to survive and flourish under normal conditions. The essential activity of invention is the creation of an innovation, and nothing else. Invention in short produces the innovation in its initial conceptualized form.

The second type of developmental activity is design. The purpose of design is to render the formulated solution or invention into an acceptable and adaptable form. What criteria are relevant to such an activity? First, we are concerned with how well the development works in the context of conditions to which it is exposed, i.e., how well does it perform? Second, we are concerned with the flexibility of the invention, i.e., its capability for being adapted into a variety of situational contexts. Finally, we are concerned with the invention's generalizability, i.e., the range of school situations into which it is possible to introduce the invention. The essential activities of design are engineering and packaging. Engineering is required to order and to systematize the components of the invented solution while packaging is necessary to render the the innovation into marketable form.

I use the words "engineering" and "packaging" deliberately because these seem to be two words which illicit a very hostile reaction from most teachers when they are first heard. These two terms seem to catch up at their worst all of the teacher's fears that he is being manipulated, that his inventiveness and creativity are being curtailed, that he is being dictated to in terms of his classroom procedures. It seems to me however, that engineering and packaging can be carried on in ways which obviate these possible faults. While it is certainly possible to engineer an invention without ever consulting a teacher or other educational practitioner, it is obviously equally possible to engineer inventions utilizing a high degree of involvement on the part of teachers. Thus, on the one hand, teachers may be used merely as guinea pigs on which the engineered invention may be field tested, but on the other hand, teachers may be used in roles that are highiy creative, leaving it to the experts merely to add the technical nuances that give the package its final professional form. I, for one, am perfectly willing to allow the degree of involvement of teachers in the design of innovations to vary broadly from project to project, hoping that we can collect sufficient empirical evidence over a relatively short period of time to guide us in a determination of what degree of involvement is best.

Similarly, there is no need to assume that the packaging of inventions implies a massive, inflexible program which the teacher must adopt whole hog or not at all. We have a number of examples of such packages now currently available, and perhaps it is because of these packages that teachers seem to assume that all packages must be of this inflexible sort. Thus, teachers adopting the P. S. S. C. materials in physics or

the S. M. S. G. materials in mathematics must accept these packages pretty much on an all or none basis; the classroom teacher has literally no control over the scope, sequence, or continuity of the materials once she has made the decision to use them. But obviously, other approaches are possible. As I am sure you all know, film makers are now producing so-called single concept films which treat, as the name implies, a single concept at a time. So for example, in relation to a course in Biology, we find available a single concept film on osmosis. This film, running in a continuous loop for about three minutes, illustrates the process of osmosis by showing how a fluid colored red which is separated by a permeable membrane from a similar uncolored fluid will gradually work its way through that membrane, resulting in a pinkish fluid on both sides. It is obviously possible to join such single concept films with single concept programs for teaching machines, with single concept printed brochures, and indeed, even with single concept tests, which the teacher may use to evaluate whether or not the particular concept has been learned. Obviously, a course could be developed around a whole series of such single concept materials, which the teacher could sample to any degree she wished, in any order she wished and elaborated in any way that she wished. Again, we see that it is possible to develop packaged materials on a variety of levels of flexibility, and again, I for one am perfectly willing to allow the question of what the ideal level of flexibility is to be settled by empirical data.

What is the relation of developmental activity to change? Obviously it is this activity, and not research, which is at the heart of change, for while research may make change possible, it is development that

actually produces an innovation that may be adopted. But just as it is not, except by chance, the researcher's task to produce developments, so it is not the developer's task, except by chance, to diffuse the now developed invention. For this purpose we need other kinds of specialists.

Before a development can achieve adoption, practitioners must know about it, they must be possessed of the facts concerning its feasibility and performance, and they must be possessed of the facts concerning the nature of the process whereby the development may be installed and institutionalized. This is the job of diffusion specialists as illustrated in the third major column of my diagram. Again, this activity has two dimensions: dissemination and demonstration. It is the purpose of dissemination to create widespread awareness of the invention among practitioners, that is, to inform or tell practitioners about the performance and process aspects of the invention. The criteria which are appropriate for the evaluation of dissemination activities include fidelity (does the message give a valid picture?), pervasiveness (does the message reach its intended audience?), and impact (does the message produce an appropriate response?). The essential activities of dissemination are reporting and interpreting: these activities perform the function of informing about the innovation.

But simple dissemination may not be enough. Extension agents in agriculture, for example, know full well that it is not sufficient to tell farmers about the advantages of hybrid seed corn or to furnish them with tables of information which illustrate the large increases in productivity that may be expected when such corn is used. A certain amount of old-fashioned protestant evangelism is needed; fervent testimonials from trustworthy and believable sources are required. This seems to me

to be best defined as a demonstration function, the second aspect of diffusion as indicated in the table. The objective of demonstration is to afford the practitioner an opportunity to examine and assess the operating qualities of the invention. The criteria appropriate to an evaluation of demonstration functions thus seem to me to include credibility (is the demonstration convincing and does it build conviction?), convenience (is the demonstration accessible to those practitioners who ought to see it?), and lack of bias (does the demonstration illustrate both positive and negative factors related to the invention or does it focus entirely upon positive factors to the exclusion of negative factors?). The essential activities of demonstration are production and staging, and its purpose is to build well-founded conviction in relation to the innovation.

We come then finally to the stage at which the invention may actually be incorporated into a functioning school system. In my diagram I have referred to this stage as adoption, which in turn is sub-divided into two further activities: installation and institutionalization. The objective of the installation activity is to adapt the innovation to an adopting school. This activity is rather like that performed by Sears when they sell you a washing machine. The washer must be delivered to your home, it must be hooked up to available sources of water and power and to sewer lines, and the housewife must be taught to operate it. The criteria of whether the installation has been successfully accomplished seem to me to be those of effectiveness and efficiency. To follow my homely washer example, whether or not the housewife is satisfied with the washer is determined by the effectiveness with which it washes her clothes and the efficiency with which it gets the job done.

Thus, installation operationalizes the innovation, and its essential activities are introduction and accommodation to the school, on the one hand, and familiarization of the teaching or other staff with the innovation, on the other hand.

Housewives have been known to return washers to Sears even after they have been properly installed. It is important to render the invention into an integrated and accepted component of the school if it is to survive for any reasonable period of time. This objective seems to me to be the proper function of what I have described in my chart as the institutionalization objective. At its most successful level, institutionalization is that activity which regularizes the innovation, i.e., converts it into a "non-innovation." The appropriate criteria for determining whether institutionalization has been accomplished are three, it seems to me: continuity (does the innovation persist over time in the school?), valuation (do the personnel associated with the innovation, i.e., teachers, administrators, pupils, parents, etc., place a high value upon it and are they willing to undergo personal discomforts rather than to permit the innovation to be removed?), and support (is this school willing to devote a reasonable portion of its budget and other resources to the support of the innovation?).

In very brief form then, the chart being projected contains my definition of a research-action taxonomy which may serve as the basis for conceptualizing a variety of mechanisms and agencies producing the change in schools which the Education Act is designed to foster. The table makes it clear that a variety of activities exists along the research-action continuum, that each of these activities has its own

peculiar objective, and that each of these objectives is judged by different criteria. The objectives and criteria for research are not the same as for development, and these in turn differ from those appropriate to diffusion or adoption. This is the crucial distinction and one which is very often misunderstood.

For the sake of clarity let me now make some additional points about this chart.

1. You may have noted that the chart does not make any explicit reference to evaluation. It should be clear however that evaluation is appropriate to each of the activities which are defined by the chart, since each activity has its own particular objective, and it has its own particular criteria in terms of which the attainment of that objective may be judged. Thus research may be evaluated in terms of its internal and external validity, invention may be judged in terms of its feasibility and viability, etc. I should like to define those evaluations which are undertaken in relation to development, diffusion, or adoption activities as <u>field studies</u>. It is imperative not to confuse field studies with research, since field studies obviously are not designed to produce new knowledge but to furnish assessments about the relative success of particular activities along the research-action continuum. Field studies are not essentially experimental or manipulative in nature, so that it seems to me entirely inappropriate, when casting about for logical or statistical designs with which to carry out the field studies, to turn to the classic experimental designs which were developed for, and intended for use in, experimental research situations. It is true that field studies and experimental research do both employ rather similar

activities, as for example, the use of certain instrumentation, somewhat similar methods of collecting and analyzing data, and the like; but in the case of field studies, I prefer to think of such activities as "research-like," to distinguish them from the more systematic tools and techniques that are used in experimentation.

While I am on the subject of field studies I would like also to differentiate them from demonstrations with which they are also frequently confused. Indeed, it is common practice when an innovation or invention is proposed to mount some kind of field activity which is designated as a demonstration but which has as one of its purposes the testing of the innovation itself. Henry M. Brickell in his well known study of innovation in New York State was one of the first to point out the essential differences between the development, field testing, and demonstration of an innovation, but while his work is widely read, his recommendations apparently have not been generally heeded. To illustrate how ludicrous the attempt to combine field studies and demonstrations is, we need only think of the Chemistry teacher performing a demonstration before his class. It is clear that what the instructor is attempting to do is to illustrate to his class the working of some already well-known chemical principle. We would not expect that he would simultaneously be attempting to establish the validity of the principle that he was demonstrating; and indeed, if that were his intention, we would not be terribly surprised to find that his class had evacuated the room while awaiting the results of the test. For some inexplicable reason however it does not seem to us to be inappropriate for an educator to be carrying out a demonstration of an educational principle or practice whose

effectiveness, performance, or operating characteristics he did not know well in advance of the demonstration. It does not surprise me, therefore, that many demonstrations are held to be unconvincing, since it is obvious that even the best developed innovations must from time to time be found unfeasible, not viable, or ineffective.

2. Another point of clarification that I wish to make regarding the diagram is to point out that what appears to be an inherent logic running from the left of the diagram to the right of the diagram does not necessarily hold in real life. Thus, it is not my contention that every activity necessarily begins with research, moves then through development, diffusion, and adoption stages into some kind of well established practice. Obviously there are a variety of feedback loops which are possible. In the first place, it is unnecessary to suppose that every activity begins with research. Research, as I have now often pointed out, may be entirely lacking in a given area, or may be so conflicting or ambiguous as to be of little help in the practical situation. It is thus not unlikely that an invention based almost entirely on experience or intuition may be developed, and that only through the attempts to put that invention into practice will we uncover the researchable questions which can then be pursued further in the laboratory. It is obviously also possible for a breakdown to occur at any stage in this process; thus an attempt to install an innovation in a real school system may reveal certain fundamental flaws in its design which did not become apparent before this point. We may thus be forced into looping back to the design stage in order to rectify the error before proceeding further. It might therefore be more convenient to think of the categories

of the diagram as actually falling upon a circle so that one can proceed from any stage to any other stage without the necessity of returning always to an identical starting point.

3. A third and final point of clarification which I would like to make about the diagram is to point out that obviously these categories are artificial and arbitrary. They happen, in fact, to be the most recent stage of thinking which our discussions have led my colleague, Dr. David Clark, and me to formulate. The question of the research-action continuum in one which has intrigued us for some time, and one about which we have had many lively arguments. We are by no means convinced that the formulation which you see projected before you is the best one that we can come up with, and we are very convinced that if it is an adequate formulation, it will very quickly lead into a better one, just as the best theories often have the shortest lives because they provide the basis for the most rapid advances of a science. If it should turn out that you do not like the particular formulations that we have reached, you are of course at liberty to produce your own, in the same way that modern geometrists, dissatisfied with the formulations of Euclid, have resorted to new formulations which, we may note in passing, have for certain purposes turned out to be more instructive and useful than Euclidian geometry. The point that I wish to make today is that it is vitally essential that we move ahead on <u>some</u> conceptualization of the activities which intervene between research and practice so that we can begin to formulate the mechanisms and agencies which are essential to carrying out these intermediate objectives.

## A PRACTICAL PLAN FOR EDUCATIONAL DEVELOPMENT

I should like to turn now briefly to a consideration of how these conceptions can be turned into a practical program for educational development. As some of you may know, I have for the past four-and-one-half years, and until a few days ago, served as the Director of the Bureau of Educational Research and Service at The Ohio State University. As the Director of that Bureau, I have of course been greatly concerned with the question of the impact that the Bureau is having upon public education. I frequently ask myself the question, "Would public education in Ohio be any different today if the Bureau of Educational Research and Service had never existed?" Generally speaking, and with no intention to demean the fine work that many Bureau staff members have contributed over the 44 years of the Bureau's existence, I have come to the conclusion that the answer to that question is "No." I seriously doubt whether the curricula being taught in Ohio schools, whether the administrative organization under which Ohio schools are operated, or the teacher training which is common in Ohio, or whether any other aspect of school operation would be markedly different if the Bureau had never existed. I think that a similar observation could be made about almost any educational organization in the United States.

It was this consideration, coupled with a good many others, of course, that led many of us on the faculty of the College of Education of The Ohio State University to reconsider our objectives and to ask whether we were organized in ways designed to foster educational expansion and development most expeditiously. We came to the conclusion that

a reorganization was necessary, and that this reorganization should be formulated in a way to reflect the basic purposes or thrusts which the professional education components of the College took to be their major purposes. One of these thrusts is the one that I have been discussing with you today, that is, the matter of educational development. Our new organization reflects this concern in the establishment of a Division of Educational Development, whose purpose it shall be to close the theory-practice gap as I have described it to you today.

We do not, of course, have a very clear idea yet of how this new Division of Education Development will organize itself and how it will operate. At the moment, I believe that our strategy can best be described as a trial and error one, within which a number of different possible approaches will be tried and will be differentiated on the basis of their empirical results. The particular projects which we have in mind at the beginning vary along the dimensions of practitioner involvement and flexibility which I spoke about earlier. So for example, in terms of involvement, we have structured a series of projects ranging, on the one extreme, from the development of certain audio-visual kits which are entirely the product of the thinking of a panel of experts, and which involve teachers only as guinea pigs in field testing, to, on the other hand, a project in which teachers are formulated into task forces for the production of materials and techniques appropriate for language-arts training in the elementary school, in which so called University experts are acting merely as consultants and packaging technicians. Similarly, in the case of flexibility, we are mounting projects which range, on the one hand, from a relatively inflexible complete course in 9th grade economics,

to, on the other hand, a project in which a wide variety of materials are being made available to teachers from which they may select in accordance with their own ideas of sequence and order. The empirical results will again decide which is the preferable point along the flexibility continuum.

A particular distressing problem which we must confront in connection with the program of the Development Division is the devising of methodologies appropriate to the field studies which we shall have to undertake in connection with the design and demonstration of innovations. Such studies and demonstrations must of necessity be carried out under realistic, naturalistic circumstances. Generally speaking, the imposition of the kinds of control required by classic experimental designs would invalidate the utility of the field test by imposing what might be called "laboratory bias" on the results. Moreover the field studies are highly contextual in nature, that is to say, their outcome depends very heavily upon the context in which they are carried on. So for example, since the context is required to be realistic and naturalistic, it is at once clear that every field study necessarily involves a wide variety of variables which are allowed to function and to interact as they normally do in nature. Field studies and demonstrations are thus inevitably multivariant. Moreover, they are subject to continual variations in their treatment conditions because of the interaction of the treatment with the context. Thus, teachers using, let us say, a new method, are likely to interact with that method and thus end up as rather different teachers at the close of the field study or demonstration from those that they were at the beginning. Furthermore, the new treatment itself may be subjected to continuous refinement and elaboration as the teachers understand it better and become more adept at its use. Finally, we may note

that field tests and demonstrations are carried out under conditions of what Ray Carpenter has called "invited interference." Under laboratory test circumstances, every effort is made to keep confounding variables from entering into the situation so that clear and unambiguous results may be drawn in respect to the particular question or hypothesis which is posed. In field tests and demonstrations, on the other hand, not only are possible confounding effects not ruled out, but conditions are actually arranged so that such confounding factors can play whatever role they normally play in nature. The result of this circumstance is, of course, that clear cut cause and effect relationships are difficult if not impossible to draw. Yet the evidence of failure or success is clear on the whole and it becomes incumbent upon us to search further so that deficiencies may be remedied or successes may be enhanced. To put it another way, the purpose of field tests may be construed as that of subjecting the utility of some development, diffusion, or adoption phenomenon to disconformation by inviting interferences of all kinds that might possibly keep its utility from being maximized. It is evidently clear that we do not now have methodologies adequate to cope with such a purpose.

We are taking two steps in an attempt to deal with this problem. First, we have proposed within the framework of our new School of Education, an Evaluation Center which will have a number of responsibilities. One responsibility will be to work with the Division of Educational Development in setting up field studies and evaluations in relation to the work of the Division. A second responsibility will be the conduct of institutional research on the problems of the new School. A third

responsibility will be to wrestle with the problem of the development of suitable evaluation designs in connection with the projects which the schools of Ohio may propose in relation to the various titles of the new Education Act, particularly Title I. We hope that the experience which the Evaluation Center will amass by its efforts in these three areas will eventually lead us to better insights and principles regarding appropriate methodology.

A second strategy which we are following relates to a particular project to be mounted this coming year known as Project Discovery. In this project, The Ohio State University will relate itself to four school systems which, through the courtesy of Encyclopaedia Britannica Films and the Bell and Howell Corporation, will serve as field centers within which the effects of the maximum availability of film and filmstrip materials may be studied. The four selected school sites are to be equipped with all of the films and filmstrips which E. B. F. produces. Each classroom is to be equipped with a suitable sound motion picture projector and film strip projector as well as room darkening equipment and screens. The teachers of the schools are to be allowed to relate to these materials in any way that they see fit.

The Ohio State University has agreed to serve as the national research center for the operation. Each of the four school districts is to develop a project relating to the use of the materials which will be essentially a developmental project and whose results will be field tested during the upcoming academic year. So for example, one of the schools is concerned with using the materials to improve individualization of instruction. A second system is concerned with the use of the materials for erasing cross-cultural differences. A third school

is concerned with the use of materials to overcome the cultural deprivation of its students. The fourth school is concerned with the use of the materials as providing an additional encoding channel through which students can be taught. It is their hope that the provision of such an additional channel may produce a marked gain in the achievement of students for whom the usual encoding channels used by schools, i.e., the teacher and the textbooks, are not preferred channels.

The Ohio State University has received the grant which will make it possible to place into each of these school settings a resident researcher who will undertake to assist the schools in mounting and evaluating these projects so as to provide a suitable basis for their demonstration during the 1966-67 school year. Researchers are currently being selected and will be trained during the summer months. Their primary mission, in addition to the operational one of mounting and field testing the project, will be to maintain a continuous surveillance of their own activities in an attempt to discover by what means data relevant to the field test can be collected most rigorously and with greatest scope. Again, it is our hope that by involvement in this project we may gain some additional insights about appropriate methodological strategies to follow.

## SUMMARY

Well, I believe that I have belabored you sufficiently for a hot July afternoon. I have tried to share with you some of my concerns--concerns that I find crucial as we stand on the eve of what will

undoubtedly be the most exciting research and development decade in educational history. The provisions of the new Education Act will make possible research and development activities beyond our wildest dreams. Yet, the experience of the past decade has convinced me that unless we take active steps toward the development of a series of intermediate mechanisms and agencies lying between research on the one hand and practice on the other, that the present gap between research and practice will be intensified rather than diminished, much to our embarrassment and chagrin and to the detriment of education.

In response to the situation, I believe that the most fruitful first step that we can take is an adequate conceptualization of the activities that lie along the research-action continuum. I have proposed such a taxonomy here this afternoon but with the caveat that it is arbitrary, incomplete, and in its earliest stages of conception. If this formulation appeals to you, I hope that you will join with me in elaborating it and subjecting it to empirical tests. If this conception does not appeal to you, I hope that you will hasten to formulate your own for some conception to guide our thinking is surely necessary.

I have also tried to indicate very briefly some of the steps that we have taken at The Ohio State University to place ourselves into a better posture to respond to the challenges that I have outlined. Again, we are only in the beginning stages of our work and at this moment I have little more than high hopes to offer to you. The test of our thinking lies in the future. We believe we are in the right track, and we stand ready to cooperate with anyone who is interested in pursuing these same goals. I hope that many of you will find it possible to join in our crusades.